INTRODUCTION

Michael Hart
NSLS Chairman

In FY 1998, following the 50th Anniversary Year of Brookhaven National Laboratory, Brookhaven Science Associates became the new Managers of BNL. The new start is an appropriate time to take stock of past achievements and to renew or confirm future goals.

During the 1998 NSLS Annual Users' Meeting (described in Part 3 of this Activity Report), the DOE Laboratory Operations Board, Chaired by the Under Secretary for Energy, Ernest Moniz met at BNL. By chance all the NSLS Chairmen except Martin Blume

The NSLS Annual Users' Meeting and the Laboratory Operations Board meeting held at BNL the same week made possible this unusual gathering of current and former administrators of BNL's National Synchrotron Light Source (NSLS). (from left) **Michael Knotek**, NSLS Chair 1985-1989, and now program advisor for Science & Technology in the Office of the Under Secretary of Energy; current NSLS Chair **Michael Hart**, who has held the post since 1995; current Deputy NSLS Chair **Samuel Krinsky**, who served as Acting Chair from 1989-1990; **Denis McWhan**, NSLS Chair 1990-1995, and now BNL's Associate Director for Basic Energy Sciences; **Arie Van Steenbergen**, who headed the NSLS Construction Project 1977-1982, and who is now actively retired from BNL; and **John McTague**, NSLS Chair 1982-1984, and now Vice President, Technical Affairs, Ford Motor Company. Not shown is **Martin Blume**, who was Acting NSLS Chair 1984-1985 and is now Editor-in-Chief of the American Physical Society.

(acting NSLS Chair 84 – 85) were present as recorded in the picture. Under their leadership the NSLS has improved dramatically:

- The VUV Ring current has increased from 100 mA in October 1982 to nearly 1 A today. For the following few years 10 Ahrs of current were delivered most weeks - NSLS now exceeds that every day.
- When the first experiments were performed on the X-ray ring during FY1985 the electron energy was 2 GeV and the current up to 100 mA – the X-Ray Ring now runs routinely at 2.5 GeV and at 2.8 GeV with up to 350 mA of current, with a very much longer beam half-life and improved reliability.

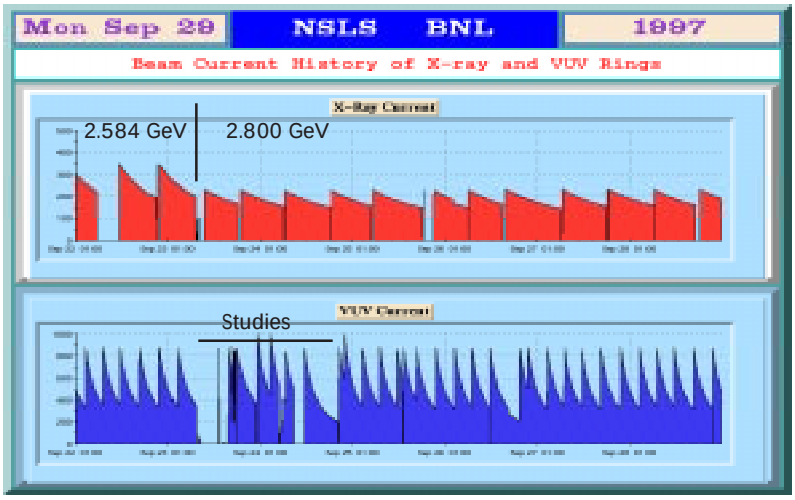

Figure 1: The first week of user beam time at 2.800 GeV.

- Starting in FY 1984 the proposal for the Phase II upgrade, mainly for a building extension and a suite of insertion devices and their associated beamlines, was pursued – the promises were delivered in full so that for some years now the NSLS has been running with two undulators in the VUV Ring and three wigglers and an undulator in the X-Ray Ring. In addition two novel insertion devices have been commissioned in the X13 straight.
- At the start of FY 1998 the NSLS welcomed its 7000th user – attracted by the opportunity for pursuing research with high quality beams, guaranteed not to be interrupted by "delivery failures", and welcomed by an efficient and caring user office and first class teams of PRT and NSLS staff.

R & D have lead to the possibility of running the X-Ray Ring at the higher energy of 2.8 GeV. **Figure 1** shows the first user beam, which was provided thereafter for half of the running time in FY 1998. In combination with the development of narrow gap undulators this mode opens the possibility of new undulators which could produce hard X-rays in the fundamental, perhaps up to 10 keV.

On 27 September 1998, a low horizontal emittance lattice became operational at 2.584 GeV. This results in approximately a 50% decrease in the horizontal beam-size on dipole bending magnet beamlines, and somewhat less of a decrease on the insertion device lines. The beam lifetime is not degraded by the low emittance lattice. This represents an important achievement, enhancing for all users the x-ray ring brightness. The reduced horizontal emittance electron beam will produce brighter x-ray beams for all the beamlines, both bending magnets and insertion devices, adding to other recent increases in the X-Ray ring brightness. During FY 1999 users will gain

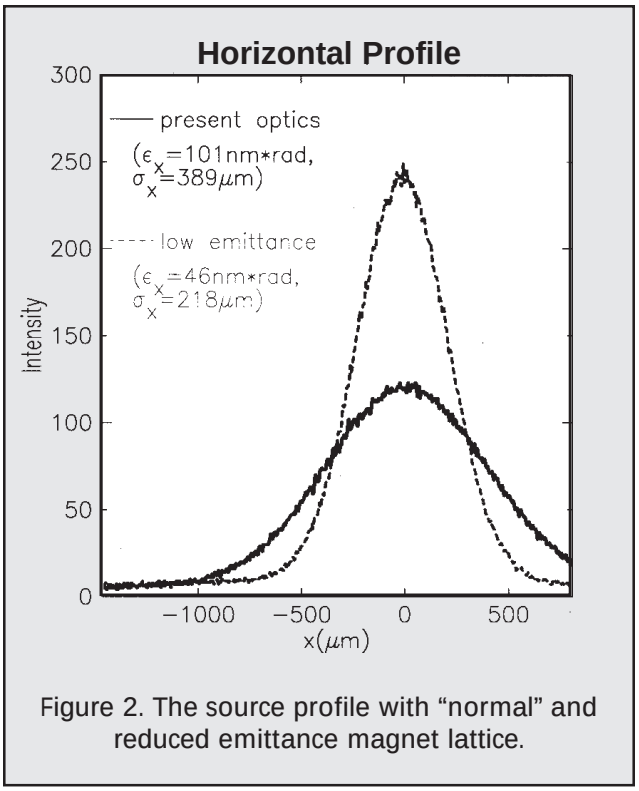

Figure 2. The source profile with "normal" and reduced emittance magnet lattice.

experience of the new running mode and plans are in place to do the same at 2.8GeV during further studies sessions. Independent evidence of the reduced emittance is shown in **Figure 2**. This is a pinhole camera scan showing the X-ray beam profile, obtained on the diagnostic beamline X28.

Finally, work has begun to update and refine the proposal of the Phase III upgrade endorsed by the Birgeneau panel and BESAC last year. With the whole NSLS facility in teenage years and with many demonstrated enhancements available, the time has come to herald in the next stage of life at the Light Source.■